

Suggested Specifications

Antec Controls Venturi Valve

Division 23 – Heating, Ventilating, and Air Conditioning

Section 23 09 00 – Instrumentation and Control for HVAC

The following specification is for a defined application. Antec Controls would be pleased to assist in developing a specification for your specific need.

PART 1 – GENERAL

1.01 Section Includes

- A. Venturi Valve – Antec Controls Model VV

1.02 Related Requirements

- A. Section 01 30 00 – Administrative Requirements
- B. Section 01 40 00 – Quality Requirements
- C. Section 01 60 00 – Product Requirements
- D. Section 01 74 19 – Construction/Demolition Waste Management and Disposal
- E. Section 01 78 00 – Closeout Submittals
- F. Section 01 79 00 – Demonstration and Training

1.03 Reference Standards

- A. All referenced standards in this section pertain to the most recent publication thereof, including all addenda and errata.
- B. AHRI 410 - Standard for Forced-Circulation Air-Cooling and Air-Heating Coils.
- C. ISO 9001 - Quality Management Systems – Requirements.
- D. ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories
- E. NEC - National Electric Code.
- F. NIST – National Institute of Standards and Technology.
- G. UL 916 - Standard for Energy Management Equipment.
- H. UL 1995 – Standard for Heating and Cooling Equipment.

1.04 Administrative Requirements

- A. Pre-installation Meeting: The contractor shall conduct a pre-installation meeting prior to the start of the work of this section, and require attendance by all affected installers.

1.05 Submittals

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data shall be provided with data indicating configuration, general assembly, and materials used in fabrication, including catalog performance ratings that indicate air flow, static pressure, NC designation, electrical characteristics, and connection requirements.
- C. Shop Drawings shall indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
- D. Certificates shall be issued to certify that the air coil capacities, pressure drops, and selection procedures meet or exceed specified requirements or coils are tested and rated in accordance with AHRI 410.
- E. Manufacturer's Installation Instructions shall indicate support and hanging details, installation instructions, recommendations, and service clearances required.
- F. Project Record Documents shall record actual locations of units and controls components and locations of access doors.
- G. Operation and Maintenance Data shall include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.
- H. Manufacturer's warranty shall be submitted and ensure forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Materials shall be furnished for the Owner's use in maintenance of the project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 Warranty

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide 60 month manufacturer warranty from date of shipment for air terminal units, integral sound attenuators, integral heating coils, and integral controls.

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PART 2 – PRODUCTS

2.01 Manufacturer

- A. Basis of Design: Antec Controls
 - 1. Venturi Valve

- B. Acceptable Manufacturers:
 - 1. The plans and specifications for the airflow control system are based on systems and equipment manufactured by Antec Controls.
 - 2. The Venturi Valve provider shall be an entity that designs, develops, manufactures and sells products and services to control the environment and airflow of critical spaces using a Quality Management System registered to ISO 9001.
 - 3. In strict accordance with this specification, alternative Venturi Valves and equipment shall only be considered for approval provided that the equipment is equal in every respect to the operational characteristics, capacities and intent of control sequences specified herein. Approval to bid does not relieve the laboratory airflow control system supplier from complying with the minimum requirements or intent of this specification.
 - 4. The manufacturer shall possess a certification of accreditation by the National Voluntary Laboratory Accreditation Program (NVLAP) for calibration laboratories, in accordance with ISO/IEC 17025.
 - 5. Manufacturers submitting as alternate suppliers shall be in compliance with the Proposed Alternate Equipment described in Section 2.01 C.
 - 6. Other acceptable manufacturers can be submitted provided they meet the specifications.
 - 7. The engineer and owner shall be the sole judges of quality and equivalence of equipment, materials, methods and life cycle cost.
 - 8. Only those systems specifically named in this specification or by addendum shall be considered for approval. Other systems submitted after the bid opening shall be returned without review.

- C. Proposed Alternate Equipment
 - 1. Equipment:
 - a. The Venturi Valve supplier shall provide a detailed proposal describing all elements of the Venturi Valve system. A schematic layout shall be provided, showing relations of these elements and a description of how they interact.
 - b. Technical specification data sheets shall be provided for all proposed system components and devices.
 - c. All proposed Venturi Valves shall include discharge, exhaust and radiated sound power level performance obtained from testing in accordance with ASHRAE 130.
 - 2. Performance Verification:
 - a. The Venturi Valve supplier shall demonstrate a typical laboratory space that includes multiple fume hoods, a general exhaust and a supply airflow control device for the purpose of verifying the Venturi Valve system's ability to meet the performance requirements indicated in this specification.

- D. Compliance Schedule:
 - 1. Any alternate Venturi Valve supplier shall provide a separate compliance schedule, which shall include the section, paragraph and subparagraph of these specifications, and a direct statement to indicate compliance or noncompliance with the requirements. For all areas of noncompliance, the supplier shall describe what specific and alternative approach has been taken and document the impact this will have on the sizing of the air delivery systems, the required cooling and heating capacities, energy costs and maintenance of the building.
 - 2. The alternate Venturi Valve supplier shall furnish a letter of compliance to the engineer, signed by a corporate officer of the Venturi Valve manufacturer, certifying the compliance and noncompliance items as stated above 10 days prior to the bid.

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2.02 Venturi Valves

A. General:

1. The airflow control device shall be a mechanically pressure independent Venturi Valve equal to the Antec Controls model VV.
2. The Venturi Valve shall be (**select one**):
 - a. A low pressure device capable of operating at static pressures of 0.3 to 3 inches water gauge.
 - b. A medium pressure device capable of operating at static pressures of 0.6 to 3 inches water gauge.

B. Performance Requirements:

1. The airflow control device shall be pressure independent over its specified differential static pressure operating range. An integral pressure independent assembly shall respond and maintain specific airflow within one second of a change in duct static pressure irrespective of the magnitude of pressure and/or flow change or quantity of airflow controllers on a manifold system.
2. The airflow control device shall maintain accuracy within plus or minus five percent of signal over the airflow range.
3. No minimum entrance or exit duct diameters shall be required to ensure accuracy and/or pressure independence.

C. Construction:

1. The airflow control device shall be constructed as (**select one**):
 - a. Non-corrosive: The airflow control device for non-corrosive airstreams, such as supply and general exhaust, shall be 14-gauge aluminum (valve body) and 16-gauge aluminum (valve cone) construction. The center shaft shall be PTFE Teflon coated 316 stainless steel. The center shaft support brackets shall be 316 stainless steel. The pivot arm and internal mounting link shall be 316 Stainless Steel. The pressure independent springs shall be spring-grade stainless steel. All shaft bearing surfaces shall be Teflon.
 - i. Supply valves shall be insulated with ¾ inch flexible closed-cell polyethylene insulation with a flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E 84.
 - ii. Sound attenuating devices used in conjunction with general exhaust or supply airflow control devices shall be constructed using 24 gauge galvanized steel or other suitable material used in standard duct construction.
 - iii. Absorptive material (**select one**):
 - a. No sound absorptive materials of any kind shall be used.
 - b. Silencers shall be absorptive type with polymer-lined acoustic media.
 - b. Coating Option – Phenolic Class P1 -I: The airflow control device for corrosive airstreams, such as fume hoods and biosafety cabinets, shall have a baked-on, corrosion-resistant phenolic coating. The center shaft shall be Teflon coated 316 stainless steel. The center shaft support brackets shall be 316 stainless steel. The pivot arm and internal mounting link shall be 316 stainless steel. The pressure independent springs shall be a spring-grade stainless steel. The internal nuts, bolts and rivets shall be stainless steel. All shaft bearing surfaces shall be PTFE Teflon
 - i. Sound attenuating devices used in conjunction with Class I corrosive airstream exhaust airflow control devices shall be constructed using [304] or [316] stainless steel material used in a corrosive airstream duct construction. No sound absorptive materials of any kind shall be used.
 - a. Coating Option – Phenolic Class P2 -: The airflow control device for highly corrosive airstreams shall have no exposed aluminum or stainless steel components. Shaft support brackets, pivot arm, internal mounting link, shall have a baked-on, corrosion-resistant phenolic coating or PFA Teflon. The internal nuts, bolts, and rivets shall be phenolic coated stainless steel or PFA Teflon
 - b. Coating Option – Kynar K -: The airflow control device for highly corrosive airstreams shall have no exposed aluminum or stainless steel components. Shaft support brackets, pivot arm, internal mounting link, and pressure independent springs shall have a baked-on, corrosion-resistant PVDF Kynar coating or PFA Teflon. The internal nuts, bolts, and rivets shall be PVDF Kynar or PFA Teflon coated stainless steel.

D. Actuation:

1. For electrically actuated VAV operation for tracking pairs (supply and exhaust valves), and two-position valves in laboratory spaces without fume hoods, a low-speed electric actuator shall be used to modulate the airflow over the range of the specific valve size.
2. A UL or CSA listed electronic actuator shall be factory mounted to the valve. The actuator shall have sufficient torque to modulate the airflow against the maximum duct static pressure (within product specifications). Loss of main power shall cause the valve to maintain its last airflow position. This position shall be maintained until power is restored.
3. For electrically actuated VAV operation for fume hood laboratories (includes all supply, general exhaust, and fume hood valves in the space), a high speed UL 916 listed electronic actuator shall be factory mounted to the valve. Loss of main power shall cause the valve to position itself in an appropriate failsafe state (**select all that apply**):
 - a. Supply/make-up air valves (**select one**):
 1. Fail to closed position.
 2. Fail to last airflow position.
 - b. General exhaust air valves (**select one**):
 1. Fail to open position.
 2. Fail to last airflow position.
 - c. Fume Hood air valves (**select one**):
 1. Fail to open position.
 2. Fail to last airflow position.

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4. This position shall be maintained constantly without external influence, regardless of external conditions on the valve (within product specifications).
 5. Constant volume valves for biosafety cabinets, snorkel exhaust, canopy exhaust, etc. shall maintain a constant volume pressure independent, manually adjustable, volume airflow setpoint. It shall be factory calibrated and set for desired airflow rate. It shall also be capable of field adjustment for future changes of desired airflow rate. Valve shall not be equipped with any pneumatic or electronic control actuator requirements. Valve airflow and pressure feedback is not required for constant volume valves.
- E. Certification:
1. Each airflow control device shall be factory calibrated to the job specific airflows as detailed on the plans and specifications using NIST traceable air stations and instrumentation having a combined accuracy of no more than plus or minus one percent of signal over the entire range of measurement. Airflow control devices shall be further calibrated and their accuracy verified to plus or minus five percent of signal at a minimum of 48 different airflows across the full operating range of the device.
 2. The calibration laboratory shall measure volumetric flow rate with the following calibration accuracy, in accordance with the scope of accreditation to ISO/IEC 17025:
 - a. 30 standard cubic feet per minute to 100 standard cubic feet per minute shall have 4.0 percent expanded uncertainty.
 - b. 100 standard cubic feet per minute to 250 standard cubic feet per minute shall have 2.5 percent expanded uncertainty.
 - c. 250 standard cubic feet per minute to 4200 standard cubic feet per minute shall have 1.4 percent expanded uncertainty.
 2. Each airflow control device shall be marked with device-specific factory calibration data, a unique serial number and a tag number. At a minimum this serial number shall be traceable to, the model number, characterization information (for electronic devices), and quality control documentation. All information shall be stored by the manufacturer for use with as-built documentation.
- F. Accessories:
1. Hot Water Heating Coil - Product code VVHWC:
 - a. The hot water coil casing shall be constructed from a minimum 22 gauge, 0.032 inch galvanized steel, factory-installed on the terminal discharge with slip-and drive attachment for downstream ductwork.
 1. An optional gasketed access door shall be provided, located on bottom of unit.
 2. Coil handing shall be specified as [right hand] or [left hand] when looking into the coil inlet in the direction of airflow.
 3. The water coil shall be supplied with an access door located:
 - a. Upstream of the water coil in the terminal casing.
 - b. Downstream of the water coil in a common casing with the coil.
 4. The water coil access door shall be secured to the casing with **(select one)**:
 - a. Screws.
 - b. Snap latches.
 - c. Quarter turn sash latches.
 - b. The water coil fins shall be 0.0045 inch aluminum fins, mechanically-bonded to seamless 0.50 by 0.016 inch copper tubes.
 1. Fins shall be formed in a high heat transfer sine wave configuration.
 2. [Standard] or [Oversized standard] coil shall have 10 fins-per-inch fin construction.
 3. [High capacity] or [Oversized high-capacity] coil shall have 12 fins-per-inch fin construction.
 - c. The water coil shall be leak tested to a minimum 390 pounds per square inch, with a minimum burst pressure of 1800 pounds per square inch.
 - d. The water coil shall be certified in accordance with AHRI 410 and units shall bear an AHRI 410 label.
 1. An optional oversized casing shall be upsized to increase heat transfer with low supply water temperatures while reducing air side pressure drop.
 2. Electric Heating Coil – Product code VVEC:
 - a. The electric heating coil shall be ETL listed to UL 1995 and CSA 22.2, and provided by the Venturi Valve manufacturer.
 - b. The electric coil casing shall be constructed from a minimum 20 gauge, 0.038 inch galvanized steel.
 - c. The heating elements shall be open wire nickel chrome construction, supported by ceramic insulators.
 - d. The integral control panel shall be a NEMA 250, Type 1 enclosure with hinged access door for access to all controls and safety devices.
 - e. The electric coils shall be provided with a primary automatic reset thermal cutout, a secondary manual reset thermal cutout, and a differential pressure airflow switch for proof of airflow.
 - f. The electric coil shall be provided with a silicon controlled rectifier (SCR) controller with Analog Control 0-10 VDC.
 - g. The electric coil housing shall be lined with [3/4 inch fiber-free], [3/4 inch solid metal], or [5/8 inch clean room aluminum foil] insulation.
 - h. **(Optional)** The electric coil shall be provided with a non-fused door interlocking disconnect switch.
 - i. **(Optional)** The electric coil shall be provided with main-line fusing.
 3. Silencer:
 - a. Construction:
 1. Casing shall be [galvanized steel], [304 stainless steel], or [316 stainless steel] construction with slip over valve connection on the valve side, and a slip-in-duct connection on the duct side.
 2. Casing seams and joints shall be lock-formed and sealed, to provide leakage-resistant construction.
 3. Perforated steel shall be adequately stiffened to insure flatness and form. Spot welds shall be painted as required.

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4. Internal baffles shall be provided with a radiused inlet and sloped tail.
 5. The silencer manufacturer shall provide a written test report showing silencer assemblies have Class 1 flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E 84, NFPA 255 or UL 723.
 6. Standard acoustic media (**does not apply to packless silencers**):
 - a. Media shall be of acoustic quality, shot-free glass fiber insulation with long, resilient fibers bonded with a thermosetting resin. Glass fiber density and compression shall be as required to insure conformance with laboratory test data.
 - b. Media shall be packed with a minimum of 15 percent compression during silencer assembly.
 - c. Media shall be resilient such that it will not pull apart during normal applications, and shall resist settling, breakdown, and sagging from vibration. Media shall not rot, mildew, or otherwise deteriorate, and shall have sufficient flexibility to readily form around corners and curved surfaces.
 - d. Media shall not cause or accelerate corrosion of aluminum or steel.
 - e. Mineral wool is not permitted as a substitute for glass fiber.
- b. Silencer type (**select one**):
1. Packless (No-Media) Silencer:
 - a. Models shall not contain absorptive media. Attenuation shall be achieved with controlled impedance membranes and broadly tuned resonators.
 2. Fiberglass-cloth Lined Silencer:
 - a. The acoustic media sound shall be encapsulated in glass fiber cloth to help prevent shedding, erosion and impregnation of the glass fiber.
 3. Film Lined Silencer:
 - a. The acoustic media shall be completely wrapped with polymer film to help prevent shedding, erosion and impregnation.
 - b. The wrapped acoustic media shall be separated from the perforated metal by a factory-installed acoustically transparent spacer. The spacer shall be flame retardant and erosion resistant.
 - c. Mesh, screen or corrugated perforated liner will not be acceptable as a substitute for the specified spacer.

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PART 3 – EXECUTION

3.01 Examination

- A. Verify that conditions are suitable for installation.
- B. Verify that field measurements are as shown on the drawings.

3.02 Installation

- A. All temperature control wiring required for a complete and operating system, as herein specified, shall be furnished and installed by the temperature control contractor unless specifically shown on the electrical drawings.
- B. The term "wiring" shall be construed to include the use of conduit, wire, miscellaneous materials and labor, as required for installation and connection of the electrical control devices furnished as part of the control system or furnished by equipment suppliers.
- C. This wiring shall include all electrical connections required as specified in the sequence of operation. All devices and wiring required for interlocking HVAC equipment as specified in the sequence of operation shall be furnished by the temperature control contractor.
- D. All line and low voltage wiring materials and installation covered by this Section shall be in accordance with the latest revision of the National Electric Code and applicable local codes and shall carry the UL label where applicable.
- E. The ATC contractor shall install appropriately sized and fused 24 VAC transformers suitable for NEC Class II wiring.
- F. All cables shall be furnished and installed by the ATC contractor. The ATC contractor shall terminate and connect all cables as required. The ATC contractor shall utilize cables specifically recommended by the laboratory airflow controls supplier.
- G. The mechanical contractor shall install all airflow control devices in the ductwork.
- H. The mechanical contractor shall provide and install all reheat coils and transitions that are not integral to the Venturi Valve.
- I. The mechanical contractor shall provide and install insulation as required.
- J. Each pressurization zone shall have either a dedicated, single-phase primary circuit or a secondary circuit disconnect.

3.03 System Start-up and Training

- A. System start-up shall be provided by a factory trained and authorized representative of the Venturi Valve manufacturer. Start-up shall include calibrating the fume hood monitor and any combination sash position/sidewall sensing equipment, as required. Start-up shall also provide electronic verification of airflow (fume hood exhaust, supply, general exhaust or return), system programming and integration to BMS (when applicable).
- B. The balancing contractor shall be responsible for final verification and reporting of all airflows. The factory trained and authorized representative of the Venturi Valve manufacturer shall be on hand to assist the balancing contractor in adjusting any airflow or velocity readings as required.
- C. The Venturi Valve supplier shall furnish a minimum of four hours of owner training by factory trained and certified personnel. The training shall provide an overview of the job specific airflow control components, verification of initial fume hood monitor calibration, general procedures for verifying airflows of air valves and general troubleshooting procedures.
- D. Operation and maintenance manuals, including as-built wiring diagrams and component lists, shall be provided for each trainee.

3.04 Field Quality Control

- A. See Section 01 40 00 - Quality Requirements, for additional quality requirements.

3.05 Cleaning

- A. See Section 01 74 19 - Construction Waste Management and Disposal for additional cleaning requirements.

3.06 Closeout Activities

- A. See Section 01 78 00 - Closeout Submittals for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training for additional closeout requirements.

END OF SECTION 23 09 00